

Written Statement

By John C. Browne, Director

Los Alamos National Laboratory

To The Strategic Forces Subcommittee

Of The Armed Services Committee

United States Senate

Subject:

Laboratory Report

April 25, 2001

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INTRODUCTION

Thank you for the opportunity to provide this statement on the status of Los Alamos National Laboratory, our national security programs, and budget needs. The Laboratory is one of three multi-program scientific institutions supported by the National Nuclear Security Administration (NNSA) in the Department of Energy. The University of California manages Los Alamos, and our mission is to

- Ensure the safety and reliability of the US nuclear weapons stockpile
- Reduce threats to US security with a focus on weapons of mass destruction
- Provide technical solutions to national security problems in energy, environment, infrastructure, and health.

KEY MESSAGES

Los Alamos has rebounded with strength and professionalism from the unprecedented disrupting and damaging events of the last two years. I am extremely proud of the professional response of our people to these crises and of their commitment to serve the nation through the mission of the Laboratory.

The stockpile stewardship mission is one of the most difficult technical challenges this nation has ever attempted. Success cannot be guaranteed. My confidence in our ability to continue to maintain the reliability of the nuclear weapons stockpile is being seriously impacted by several trends:

- Our nuclear weapons are past their design age and are not aging gracefully. A long-term plan explicitly stating which weapons are needed in the US nuclear deterrent force must guide the timing and priorities of the Stockpile Life Extension Program as well as rebuilding the manufacturing capability to produce weapons.
- We are experiencing an unmitigated deterioration of the infrastructure of the labs and plants in the nuclear weapons complex. We strongly support Gen. Gordon's 10-year Facilities and

Infrastructure Revitalization Initiative. Without it, we will not be able to carry out either the manufacturing or certification efforts for the stockpile.

- We are concerned about recruiting and retention of the staff with the critical skills needed for our mission. Outstanding people can be attracted to the public service nature of our mission and the technical challenges of the work. However, improvements in scientific facilities and equipment are needed to help us compete with private-sector recruitment.
- The President's budget for FY-02 has serious shortfalls to achieve all the requirements of the Stockpile Stewardship Program. The overall direction of the Stockpile Stewardship Program is sound. NNSA has made great strides in its first year to develop needed policy, program and organizational refinements. The Future-Years Defense Program (commonly referred to as FYDP) plan proposed by Gen. Gordon is a big step forward. This plan, if supported by the Administration and the Congress, should help the program maintain the safety and reliability of the stockpile through this decade.
- I wish to note that significant accomplishments were achieved in the nonproliferation area, including development of new systems for detecting proliferation of weapons of mass destruction. The budget cuts outlined for the Nuclear Nonproliferation and nondefense programs will have major long-term programmatic impacts and will cause serious disruptions in our staffing.

Our highest priority at Los Alamos is re-establishing the nation's capability to manufacture plutonium pits, the heart of nuclear weapons. Los Alamos has built seven development pits and is on schedule to deliver a certifiable W-88 warhead pit in 2003. We have developed an initial project baseline for certifying these pits for War Reserve use without nuclear testing.

We continue to improve the Laboratory's operational performance. We are now applying integrated management methodology to safety, security, and project management. Despite the severe disruption resulting from security events and the fire, the Laboratory continued to improve in safety and to deliver on its manufacturing commitments.

The Laboratory has rebounded from damaging events over the last two years. Congressional support has been critical to helping us meet our mission, rebuild the Laboratory, and restoring our town after the Cerro Grande fire. Thank you!

LABORATORY STATUS

Our excellent technical staff at Los Alamos National Laboratory continue their outstanding support of the nation's security, although everyone at the Laboratory was and to some extent still is profoundly affected by the traumatic events of the last year. We are hard at work sustaining the nuclear weapons stockpile and helping with many of the nation's most difficult technical national security problems. We have also refined our management processes to address lessons-learned from these events: the discovery of the unauthorized copying of classified information, the Cerro Grande fire in May last year, and misplacing hard drives containing classified data.

In addition to the physical damage to the Laboratory, the fire disrupted Lab operations for months. Although most of the Lab was able to reoccupy work space and resume operations in June, some work areas were not immediately habitable or were declared permanently closed because of the threat of flooding from burned area rain runoff. The DOE, the Army Corps of Engineers, and other agencies with the strong support of Congress have expedited repair and remediation of fire damage. We are extremely grateful for prompt action.

Rebuilding of the Los Alamos townsite, which suffered more damage than the Laboratory, has also been strongly supported. Project Recovery, which had strong participation from many quarters including the University of California, has helped to get our community back on track so that our people can again be fully productive.

Your continued support of our mission will help me to keep rebuilding the confidence and strength of our workforce.

DEFENSE PROGRAMS

Stockpile Certification

The stockpile stewardship mission, particularly maintaining the certification of nuclear weapons without nuclear explosive testing, is one of the most difficult technical challenges this nation has ever attempted. Success cannot be guaranteed. While I am confident of the current safety and reliability of the nuclear weapons stockpile, this confidence is being seriously impacted by several trends. The nuclear weapons in the stockpile are aging past their design lives. Indeed, our stockpile is aging in different ways than we anticipated at the start of the stewardship program. The nuclear weapons infrastructure needed to refurbish the stockpile, including facilities at Los Alamos, are deteriorating with age and have not been sufficiently

maintained or revitalized to meet even our immediate needs. We are having difficulty retaining and recruiting qualified personnel. There is great demand for talent in science and technology, especially US citizens. Funding continues to fall short of that needed for the stockpile stewardship mission. However, the Future Years Defense Program (FYDP) plan proposed by Gen. Gordon is a major step toward developing the much-needed plans and policies that support the stockpile.

Our fifth annual stockpile assessment letter, signed in November 2000, is supported by year-round activities for *surveillance* of stockpiled weapons—including destructive disassembly of a weapon for inspection and testing of components, and other less-intrusive inspection techniques. Experienced Laboratory personnel assess the safety and reliability of the weapons based on these surveillance findings and through a wide range of experimental and computational capabilities. I develop my *assessment* from their expert judgment and the documented condition of the weapons. This annual letter to the Secretary of Energy and the Secretary of Defense contains my assessment. The refurbishment of the stockpile is NNSA's *response* to these surveillance findings and assessments.

To develop the certification capability needed as we get farther from the time when weapons were tested, we have continued to enhance our technical capabilities, including new experiments and simulation of weapon performance.

Infrastructure

On March 13, I provided a statement on facilities and infrastructure needs to the Energy and Water Development Subcommittee of the Senate Appropriations Committee. From that statement I will take these summary points:

The general run-down condition of facilities in the nuclear weapons complex has been noted recently in several reviews chartered by Congress and the Administration. For example, the Chiles Commission identified the need to "eliminate problems of maintenance of equipment and facilities, and modernization of equipment," in the context of enhancing recruitment and retention of a quality workforce. The Hart-Rudman U.S. Commission on National Security wrote in January 2001 "the physical circumstances in which lab professionals work have also deteriorated, in many instances, to unacceptable levels."

The Laboratory believes that there are three distinct areas that must be addressed to ensure infrastructure sustainability to meet our mission set. Those three areas include:

- Implementing formal facilities consolidation and cost reduction initiatives to reduce facility footprints, which in turn reduces operating costs, and improves safety, security, and scientific interactions;
- Addressing unfunded high-priority facility maintenance backlogs before they become expensive emergency repairs; and
- Investing in new construction projects, where appropriate and economically feasible, to ensure that the Laboratory can meet programmatic mission needs over the next twenty to forty years.

These all require commitments to achieve positive results, but will realize return on investment through reduced operating costs (maintenance and energy) and increased technical productivity. In addition, each area addresses safety and security needs and allows Laboratory facilities to be sustainable over the next 20 to 40 years.

The best way to ensure that the necessary reinvestment occurs in the facilities, infrastructure, and construction base is to provide the resources through a dedicated budget category. We strongly endorse the NNSA Facilities and Infrastructure funding initiative. We believe the top-priority construction projects must be completed to ensure that the NNSA complex has a safe, secure and reliable infrastructure to ensure that programmatic missions can be accomplished.

Accelerated Strategic Computing Initiative

The NNSA Accelerated Strategic Computing Initiative (ASCI) has been a tremendous success in providing us with the needed computational tools to effect stewardship. We are making rapid advances in the ability to simulate nuclear explosions faster and with greatly increased detail. Computational models and codes under development allow us to investigate complex issues arising in the stockpile. These codes can accomplish phenomenal tasks, modeling asymmetric features such as cracks, gaps, bolts and fixtures that were previously intractable. It is absolutely necessary to be able to model these geometrically complicated details in weapons, and compare the simulations to relevant experimental data.

Last year, Los Alamos completed the first-ever three-dimensional simulation of the explosion of a nuclear weapon secondary, eight months ahead of schedule, using both the Los Alamos and Sandia ASCI computers. This accomplishment included the transfer of mammoth data files from Los Alamos to Sandia using the distance-computing component of ASCI. At Los Alamos, calculations are now run routinely on thousands of processors. Today, Los Alamos is running the

first-ever three-dimensional full-system simulation (primary and secondary) on the 12 teraOPS (trillion operations per second) ASCI platform at Lawrence Livermore National Laboratory.

Los Alamos also signed a contract with Compaq for the next generation ASCI-class computer at Los Alamos, called the “Q Machine,” designed to run at 30 teraOPS— which will be the largest and fastest in the world. Q Machine delivery starts this fiscal year. The construction of the Strategic Computing Complex (SCC)—the most modern in the world—to house the Q Machine and approximately 200 weapons scientists is a great project management success story for NNSA and Los Alamos. The SCC is progressing within schedule and budget. This modern facility features an uninterrupted computer floor the size of a football field surrounded by offices with high-speed secure communications links.

As part of our leadership in high-performance technical supercomputing, computer science, and computational science, Los Alamos and Rice University have proposed a national center for computer and computational science research in the form of an Information Technology Laboratory in Santa Fe, New Mexico, that would be operated by Rice University.

Dual Axis Radiographic Hydrodynamic Test Facility

An outstanding achievement in the last year was the application of the first axis (Phase I) of the Dual Axis Radiographic Hydrodynamic Test facility (DARHT) to stockpile-related hydrodynamic testing. This phase of DARHT was completed on time and within budget, has been commissioned, and is now giving us excellent, high-resolution data in support of stewardship. DARHT, and its still-capable predecessor PHERMEX, will be the key hydrodynamic test facilities in the next few years for maintaining stockpile certification as well as supporting stockpile refurbishment activities. DARHT is a great advance in capability, and will only get better as the second axis is completed and commissioned, and as we begin to image dynamic implosions with multiple temporal frames using both axes of the facility.

Nevertheless, we do know that the capabilities of DARHT, advanced as they are, will still be insufficient to meet all of the anticipated challenges of stockpile stewardship. We know that two axes are insufficient to observe key three-dimensional features of weapons implosions. And, we know that we must observe the time evolution of the implosion—create a motion picture—to develop the all-important validated 3D ASCI codes to certify the stockpile in the future. The path to that capability has been demonstrated by proton radiography.

Proton Radiography and an Advanced Hydrotest Facility

In the future, proton radiography (P-Rad) holds great promise for refined hydrodynamic testing of weapons, beyond the capabilities of DARHT, that will be sufficient to meet our most difficult stockpile certification requirements. The requirements for an Advanced Hydrotest Facility (AHF) could be met using proton radiography to make a very high-resolution motion picture of an imploding warhead made of surrogate nuclear materials with unprecedented detail. This will allow very high-fidelity comparisons with our computational models. We are presently developing proton radiography through dynamic (explosive) tests on small objects at the Los Alamos Neutron Science Center (LANSCE) and static tests on full-thickness assemblies at Brookhaven National Laboratory, confirming the extraordinary fine temporal and spatial resolution. The results of these small-scale dynamic tests are stunning in their resolution and detail and have already helped resolve real stockpile issues.

AHF can provide a very powerful tool for maintaining stockpile certification without nuclear testing. Indeed, obtaining high-fidelity radiographic motion pictures of imploding surrogate warheads will be the next best means of probing weapons implosions, short of testing actual nuclear devices.

Subcritical Experiments

Analysis of data from last year's subcritical experiments at the Nevada Test Site (NTS) has contributed substantially to my current stockpile assessment. Subcritical experiments are an important component of the stockpile stewardship program since they test significant amounts of special nuclear materials (SNM) under implosion-like conditions to measure materials properties. These nuclear-material assemblies remain below nuclear criticality. Subcritical experiments are essential to understanding implosion phenomena. We are doing development experiments and our next "subcrit" is scheduled for FY-02, with a full schedule of future experiments supporting certification.

Laboratory-Scale Experiments

We know we do not know enough about the aging behavior of materials to confidently certify the stockpile for its projected extended lifetime. We use a wide range of laboratory-scale experiments on special nuclear materials and other weapons materials in our current stockpile

assessment activities. These small-scale experiments also support fundamental design assessment and certification issues.

An example is the study of chemical high explosives used to implode the weapon pit. Laboratory personnel must be able to predict how explosives will respond as they age, in extreme environments or under accidental impacts. Experimental work on high explosives done with proton radiography, neutron scattering, laser spectroscopy, and other means is leading to increased understanding of high-explosive performance that we will use to substantiate weapon safety and reliability. Los Alamos remains one of the few places in the world with full-spectrum capability for both high-explosive synthesis and experimental research.

Our unique facilities, including LANSCE and special nuclear materials laboratories, have enabled more precise characterization of the fundamental properties of plutonium and other nuclear materials by static and dynamic neutron scattering, high explosive-driven dynamic experiments, use of diamond-anvil high-pressure cells, gas-gun and subcritical experiments, and other technologies. Last year, new nuclear data obtained from LANSCE were incorporated into weapons models, improving our understanding of the difference between computationally modeled performance and measured weapons yield from past NTS tests. This will ultimately lead to more accurate models that provide higher confidence in our prediction of weapon performance. These experiments yield information that will be used to strengthen and validate theories, models, and computer codes that will, in turn, be used to assess the condition of the stockpile.

Stockpile Life Extension Programs

As stockpiled weapons age beyond their design lifetimes, which was nominally 20 years, the *surveillance-assessment-response* cycle that we use to sustain the nuclear weapons stockpile must grow to include weapon refurbishment. In fact, since the nation currently has no plans to introduce new weapons into the stockpile, deployment of most existing weapons systems is expected to continue through 2040, resulting in sixty-year service lives. The national program to refurbish aging nuclear weapons over several decades is known as the Stockpile Life Extension Program (SLEP). Findings from stockpile assessment activities are key to determining the SLEP refurbishment details and schedule required. Three Los Alamos-designed weapons, the W76, the B61, and the W80, have authorized refurbishment activities.

Los Alamos contributes strongly to the SLEP through our manufacturing base. The Laboratory is the second largest production plant in the complex. The new Beryllium Technology Facility at Los Alamos will become qualified to make beryllium parts for weapons refurbishment late this year—the only such capability in the nation. The Laboratory has delivered on its commitments to provide tritium-loaded neutron sources to Sandia National Laboratories and detonators to the Kansas City assembly plant. Our professional and dedicated staff made the special efforts necessary to meet the detonator delivery date, which was close on the heels of the Cerro Grande fire, thus avoiding a delay in the national weapon refurbishment program. Los Alamos is meeting all of our manufacturing commitments.

SLEP activities will span several decades of intense plant activities and will depend on experienced personnel and qualified facilities. However, the number of experienced personnel across the nuclear weapons complex is decreasing every year. National facilities and infrastructure are limited in capacity and are deteriorating as they age. Indeed, important elements of our capability have been degraded, diverted, or lost and must now be reestablished. We critically need a revitalized nuclear weapons infrastructure—personnel as well as facilities—at both plants and labs.

Delay is not an option. The age of the stockpile and the deterioration of the infrastructure have already caught up with us. The decades-long job of refurbishing the stockpile is too much for the existing infrastructure capacity and capability. Further neglect will make the situation much worse. The SLEP workload must be leveled across the facilities to optimize plant capacity and availability and to minimize required investment. SLEP schedules must be coordinated across the weapons types in the stockpile to meet military requirements and to keep the weapons safe and reliable throughout their planned deployment. Moreover, additional money is required in order that Los Alamos continue to support W76 SLEP workloads while also having funding to properly share system information regarding the transfer of the W80 SLEP to Livermore.

It is important that the laboratories remain fully engaged in the care of the stockpile. Our people must learn from real systems to improve their capability to meet the challenge of maintaining and certifying the safety and reliability of these refurbished weapons without nuclear testing.

Pit Fabrication

Our highest priority at Los Alamos is replacing the nation's capability to manufacture plutonium pits, which are the heart of nuclear weapons. This capability was lost 12 years ago when the Rocky Flats plant was closed.

One warhead type, the W-88, has been selected as the crucial prototype for restoring the nation's nuclear manufacturing capability. Steps taken include moving personnel previously employed at the Rocky Flats pit manufacturing plant and some of their manufacturing equipment to Los Alamos. In fact, we now have about 20 key people from Rocky Flats working at Los Alamos as part of our 220-person pit manufacturing team. With their expertise, we are recovering Rocky Flats fabrication processes and documenting them in detail.

Seven W-88 developmental pits have been fabricated in the Los Alamos's Plutonium Fabrication Facility (at Technical Area 55) for process development and qualification. These manufacturing processes will be formally qualified to the rigorous requirements necessary for a certifiable War Reserve W-88 product. Pits made with the new processes will be more uniform and better documented than the pits now in the stockpile. We are on schedule to deliver a certifiable pit in 2003.

Pit Certification

Pit certification may be the most difficult challenge of stockpile stewardship. Our pit certification program is designed to demonstrate that the implosion properties of the Los Alamos pits and the Rocky Flats pits are equivalent. We will execute the complex and broad spectrum of physics and engineering testing necessary to certify the Los Alamos W-88 pit. The date at which a qualified W-88 Los Alamos War Reserve pit will be ready to enter the stockpile has been delayed to 2009. Let me explain this.

The requirements of stockpile stewardship continue to mature, as is characteristic of highly technical, R&D-based, scientific programs. Last year the NNSA asked us to develop a revised project plan for pit certification. We have carefully examined all the requirements for pit certification and have refined our original plan and completed a new baseline. These were provided to the NNSA in the fall of 2000. This baseline includes our current best understanding of pit certification needs. The present estimated cost and schedule to certify the W-88 pit has increased beyond our original 1999 projection which did not include contingency. I believe we now have a comprehensive and achievable plan that includes adequate contingency.

The nation must have the ability to produce replacement pits. We are confident that we can produce qualified replacement pits under our project plan. Although pit fabrication is on track, the challenge we now face is to develop an official NNSA baseline for certification that can deliver a War Reserve pit and to obtain the funding needed to execute it. The resources needed to carry out the proposed baseline for pit certification are contained in the NNSA FYDP. I hope that once the defense policy reviews currently under way in the Administration are completed, additional resources necessary to ensure the success of the pit certification program for the NNSA will be provided.

Over the last year and a half, Los Alamos has implemented rigorous project management practices to the pit manufacturing and certification programs. Laboratory management, and myself personally, will intensively monitor execution of these projects assisted by internal and external reviews. We know well the importance of this program to the nation.

Resources

I am sometimes asked about whether the stockpile stewardship program without nuclear testing will work in the long run, or even whether we are making the right kind of investments. My answer is that the program is solidly based on fundamental scientific principles and continues to evolve with our best understanding of what is and will be required to maintain the safety and reliability of the stockpile. While I cannot guarantee success of the program indefinitely nor avoid every exigency that might arise, the investments now being made are key to ensuring the safety and reliability of the stockpile.

The success of the stockpile stewardship program is more likely if the challenges have commensurate resources provided as laid out in the NNSA Future Years Defense Program (FYDP) plan. We need a long-range commitment to facilities and infrastructure re-capitalization, and funding for the advanced technologies and activities needed for pit and stockpile certification, and for reaching the computing performance goals laid out for ASCI. The FYDP accommodates most of the high-priority needs of the program, including the National Ignition Facility and the beginnings of an Advanced Hydrotest Facility.

Although we support accountability for resources and deliverables in the stockpile stewardship plan, we have concerns about the current budget and appropriations structure. Prior to FY-01, Defense Programs funds were appropriated in five budget categories. As a result of budget restructuring by the DOE and in appropriations, the 5 categories have become 30. These

narrowly defined accounts limit our ability to address changing programmatic priorities across the two fiscal years between budget formulation and program execution, ultimately making it more difficult for us to operate efficiently. Emerging issues such as those resulting from weapon surveillance findings as well as evolving institutional needs within a fiscal year, such as safety and security improvements, cannot be addressed in a timely manner under these constraints. Currently the reprogramming process with its \$5M internal reprogramming limit severely constrains the ability of NNSA and the Laboratory to respond to compelling programmatic priority changes. We recommend returning to broader budget categories for appropriations, or raising DOE's reprogramming authority, or both. Resource and deliverable accountability to Congress can be accomplished through improved planning, project controls, and reporting requirements. I believe the NNSA FYDP will greatly help this situation.

I look forward to your support toward these ends.

NONPROLIFERATION AND THREAT REDUCTION

Defense Nuclear Nonproliferation R&D

Recent technical achievements in the Laboratory's nonproliferation and threat reduction programs continue to enhance the nation's capability to deter, detect, and respond to evidence of proliferation or deployment of weapons of mass destruction (WMD). Despite the vital national security capabilities supported through NNSA nonproliferation and verification R&D, this program is facing significant cuts in the Administration's FY-02 budget. These cuts will prevent the development and implementation of new technologies that will allow the nation to stay ahead of evolving threats.

Detecting nuclear explosions, a key component of the program to support treaty monitoring, has seen major deployment successes of Los Alamos systems this past year, including a network of ten infrasound units fielded to a remote site and the launch of a combined x-ray dosimeter (CXD) sensor onto the GPS constellation. This sensor can detect x-ray emissions from nuclear explosions and x-ray bursts from solar phenomena that can disrupt communications. Los Alamos also recently upgraded the seismic knowledge base for AFTAC to improve monitoring of nuclear explosions in Asia.

Activities in proliferation detection in the past year include the successful launch of the Multispectral Thermal Imager (MTI), a joint effort with Sandia National Laboratories and

Savannah River Technology Center. Los Alamos operates the Data Processing and Analysis Center for this instrument to provide images to government and civilian agencies for nonproliferation and environmental applications. Los Alamos has also successfully field-tested the remote ultra low-light imager (RULLI). Los Alamos has developed and transferred to agency users a new data analysis method called GENetic Imagery Exploitation (GENIE) for scanning image data sets for indication of WMD production.

The Chemical and Biological National Security Program element is developing technologies that address the bioterrorism threat through early detection. The Biological Aerosol Sentry and Information System (BASIS) Domestic Demonstration and Application Program (DDAP) provides early warning of airborne biological incidents for special events such as large assemblies and high-visibility meetings. Planned for use in civilian settings, it will detect a biological incident within a few hours of an attack, early enough to mount an effective medical response. Los Alamos is also developing an optical biosensor for the rapid detection of toxins and pathogens that might be used by terrorists. This sensor provides ultra-sensitive pre-symptomatic detection of pathogens or infectious agents in the environment, is adaptable to detect multiple agents, is convenient enough for use by emergency first responders, and has exchangeable sensor elements for reuse.

Russian Programs

In the early 1990s several programs were initiated to deal with the threat of dispersal of Former Soviet Union (FSU) nuclear weapons, weapons materials, and technology. Today the US, with support from the national laboratories, is engaged with Russian and other FSU institutes to protect and to reduce the amounts of nuclear materials and the size of Russia's nuclear complex.

The DOE's Materials Protection, Control and Accountability program (MPC&A) is securing nuclear weapons materials at defense facilities throughout Russia, to date resulting in significant security enhancements for 70 percent of the nuclear materials at Russia's Ministry of Atomic Energy (MINATOM) locations. Los Alamos' expertise in nuclear measurements and computerized accounting systems has been transferred successfully to several Russian nuclear sites.

The fissile materials disposition program is designed to eliminate excess nuclear materials from the US and Russian weapons programs. Los Alamos has developed an environmentally

friendly process called the Advanced Recovery and Integrated Extraction System (ARIES) which converts weapon pits into a form suitable for burning in conventional nuclear power reactors. ARIES has been selected as the basis for an industrial-scale conversion plant to be built at Savannah River, which will convert tons of excess US weapon plutonium into non-weapon form. We are working with Russian experts to develop a comparable method for their use.

Under the DoD's Cooperative Threat Reduction (CTR) program, a secure storage facility is under construction at Mayak in Russia to store fissile material no longer needed by Russia's nuclear weapon program. Technical measures are being developed to ensure that nuclear materials arriving at the site, in fact, come from the Russian nuclear weapon program.

Los Alamos has also been instrumental in implementing programs to convert the vast Russian nuclear infrastructure to civilian pursuits. Hard evidence of the success of these programs include (1) The Open Computing Center at Sarov provides a pathway for commercialization of Russian nuclear scientist talent in computer science and applications and now employs 100 former defense workers with plans to increase that number to 500 by 2005 ; and (2) Moving the security fence at the Avangard nuclear production facility to provide more access to existing buildings, converting 500,000 square feet into non-defense work.

Critical Infrastructure / Homeland Defense

Los Alamos programs in threat reduction also include efforts to counter domestic terrorism and provide for defense of the homeland. One of the most significant efforts is aimed at understanding the interdependencies of the nation's critical infrastructure, an outgrowth of the Lab's expertise developed in metropolitan travel forecasting with the Transportation Analysis and Simulation System (TRANSIMS). Los Alamos is a charter member of a broad initiative, the National Infrastructure Simulation and Analysis Consortium (NISAC), that will provide a decision-support environment for government and industry decision-makers in the areas of infrastructure policy, education, planning and assessment, and crisis response. NISAC is well positioned to provide the technical support function for the principal coordinating agency for national security involving critical infrastructure protection.

The NNSA labs are also expanding our partnership with the DoD for ballistic missile defense. The laboratories are providing innovation and technical assistance in the areas of boost-phase intercept, mid-course discrimination of countermeasures, modeling and simulation to support acquisition and planning methodologies, advanced kinetic kill vehicles, and testing and

evaluating component designs. We expect this cooperative partnership to grow significantly in FY-02 and beyond.

STRATEGIC AND SUPPORTING RESEARCH

Effective execution of the Laboratory's national security tasks is enabled and supported by including a broad range of activities in basic science and technology. This was wisely recognized by Congress when Mission 6, "To support United States leadership in science and technology," was included in the NNSA charter (PL 106-65). I will illustrate the value of these activities with a few examples of recent achievements.

The first I will cite—only briefly because it is already described above—is proton radiography. The personnel and enabling technology came from our work supported by the DOE Office of Science and had an incubation period helped by Laboratory Directed Research and Development (LDRD). This very brief mention should not leave unstated the importance of proton radiography to the future of Stockpile Stewardship Program and the high level of synergy between basic and defense sciences that brought it into practice.

The second example I will cite is quantum information technology. Los Alamos is helping lead development of the use of information bits at the quantum (atomic) level for computing and information security. These technologies are truly revolutionary and appear to be on track to enabling new frontiers in computing power and communications security. Again, the people and the technologies came largely from Office of Science-supported programs.

My final example is from the Human Genome Project. Hardly any Laboratory program has had a longer history of contributing to both civilian and defense needs. Many of the advancements in genomics that fill the newspapers had origins in, and continue to receive benefit from, DOE-supported biological research. Application of bioscience in the nonproliferation and threat reduction programs is already widespread, helping protect the nation from bioterrorism and the threat of biological weapons of mass destruction.

STAFFING

A major issue facing the NNSA Laboratories and addressed by the Chiles Commission is attracting and retaining the personnel needed to meet our future missions. Two facts that give us concern are the age distribution of our technical staff, averaging 47 years, and the ages of the

weapons designers, averaging 54. Recruiting and retaining outstanding personnel must now be considered one of our most serious and persistent management challenges.

Los Alamos has several programs to strengthen our human resources. With Lawrence Livermore National laboratory, and as part of the University of California contract with NNSA, we are in the process of developing collaborative 5-year staffing plans to address recruiting, retention and training issues supporting the nuclear weapons program. Los Alamos has developed several recruiting incentive programs including hire-on bonuses, employee referral bonuses, pay incentives for "hot skills" like computer science, and an enhanced relocation package. Los Alamos has established recruitment "pipelines" by hiring students to introduce them to the work of the Laboratory.

Our postdoctoral program attracts outstanding scientists and engineers with recent Ph.D. degrees to participate in cutting-edge work with Laboratory researchers. Many of these "post docs" prove themselves to be valuable researchers and we invite them to make their career at the Laboratory. Over our history the Los Alamos mission has been greatly enriched by these wonderfully talented young researchers.

However, the number of LDRD-supported postdoctoral employees at LANL was down 38% in FY-00, because of the LDRD cut as well as the reduction in qualified applicants, discouraged we assume by the flood of negative publicity. The total number of post docs at LANL is still down by 25% in FY-01 but appears to be returning to previous levels. Continued involvement in basic science programs, especially with the flexibility afforded through LDRD, is essential to Los Alamos in recruiting postdocs. Authorization of another, more direct mechanism to support strategic hiring, such as a salary pool funded through an additional 1% in Lab overhead, might be considered by NNSA and Congress.

Our proposed Information Technology Laboratory (ITL) in Santa Fe will be an effective recruitment and retention tool. Managed in collaboration with Rice University, the ITL will be a national focus for computer and computational science. Coupled with our world-class ASCI computing facilities and our engagement in the most challenging technical problems in the world, this will attract outstanding faculty and students from the university community who will have a rich opportunity for collaboration with Laboratory staff.

We remain troubled over possible impressions that the NNSA Laboratories have an unfavorable employment atmosphere, particularly as seen by some in the Asian-Pacific Islander

community. Although the DOE-IG did not find evidence supporting this concern, we are working to correct this impression and to ensure fair treatment for everyone.

Tight funding overall exacerbates the problem of staff revitalization. The funding levels in the President's FY-02 budget request will not allow Los Alamos to bring in new scientists and engineers who are needed to take over the responsibilities from senior people as they move on and retire. We look forward to the Hamre Commission findings and advice on maintaining leadership in science and security.

OPERATIONAL EXCELLENCE

The nation expects its national laboratories to execute their missions with a high level of operational excellence. Los Alamos strongly supports that expectation. Our work should be conducted with the utmost care for the safety and fair treatment of our workers and the public, respect for the environment, protection of national security information, and effective use of taxpayer-supported resources.

The January 2001 decision by the DOE to extend the Management and Oversight (M&O) contract for the Laboratory with the University of California (UC) included new provisions designed to enhance operational excellence. Achievements in this area, such as illustrated below, were important in that decision. Continuation of the contract was very welcome news to the Laboratory staff, who worked hard to realize these improvements.

Safety

Los Alamos has reduced its Occupational Health and Safety Administration (OSHA) Lost Workday Case Rate (LWC) by a factor of four, from an LWC of 4 per 200,000 work-hours in 1996 to an LWC of 1 today. Even the Cerro Grande fire, which subjected the Laboratory to emergency conditions for over two weeks, did not cause our LWC or injury rates to jump. LWC is a standard OSHA metric of days per year lost to on-the-job illness or injury. We are now equal to best-in-class rates among comparable US industries.

We did this by adopting a new approach in 1996, Integrated Safety Management (ISM), a system that fully engages the workforce from top to bottom in taking individual responsibility and initiative for safety.

Although the trend is favorable, we recognize that safety incidents at Los Alamos, especially in our nuclear facilities, can be very visible. Since setting clear and challenging goals is well

received at this Laboratory, I have set a goal to cut LWC by half, to 0.5, in two more years. Achieving this goal will make us best in class for R&D organizations worldwide. We will add other metrics to help improve our safety performance.

Nuclear Facility Operation

The UC M&O contract extension requires us to engage outside expertise in nuclear facility operation. Therefore, Los Alamos has already awarded agreements to BWX Technologies and Westinghouse Government Services Company. Both companies have experience operating nuclear facilities for DOE. The companies will help the Laboratory improve its operation of nuclear facilities, including the Plutonium Facility, Chemistry and Metallurgy Research facility, and critical experiment facilities.

Security

As with safety, everyone must pull together for the institution to be successful in security performance. In FY-00 we launched the Integrated Safeguards and Security Management (ISSM) program, which actively engages the entire workforce to integrate security into all work practices. Security awareness is up and security incidents are down compared with last year.

A key element of the safety and security programs is to ensure that every worker is trained in these responsibilities. To ensure that security training is kept current, the security area badge system will now automatically reject entry for anyone whose required training has lapsed.

Secure work habits are fostered in a secure environment with the right tools for the job. We have strengthened the security environment in X Division by upgrading weapons designer workspace to a security exclusion area, involving additional access controls. Security vault access procedures have also been strengthened. Classified media accountability has been implemented, with over 65,000 items bar-coded. We are piloting an automated accountability system to track and inventory classified media.

Making satisfactory progress in security was an important element in DOE's decision to extend the M&O contract with UC. To provide additional expertise and meet requirements in the contract extension, UC has already engaged the Aegis Research Corporation to help with safeguards and security.

We remain concerned over the balance of effort and resources directed toward physical security versus cyber security. We think that a risk-based approach would direct more resources,

around one-quarter of the total security budget, to cyber security. The cyber security funding proposed in the NNSA FYDP would provide the resources necessary for future program success.

Project Management

Laboratory organizational changes have strengthened project management, with visible results. About 40 projects ranging from a few million up to \$165M as the largest, such as the Strategic Computing Complex (SCC) construction, are in a formal project management system that provides detailed management and reporting tools and the training to implement them.

For reporting to upper management, the system provides project performance scores in four general categories. We then direct special attention to projects as necessary based on these scores, including regular reviews by my senior management team and myself. Important projects that this system has helped make successful include DARHT Phase I, the Strategic Computing Complex, Accelerator Production of Tritium, the Atlas pulsed-power machine, the Los Alamos Spallation Neutron Source subproject, and the Beryllium Technology Facility.

Our project management system was put in place following recommendations from an external panel of experts appointed to review Laboratory project management. For continued outside advice and to meet requirements in the UC M&O contract extension, UC has already awarded an agreement to Parsons Infrastructure and Technology Group for project management expertise.

Cerro Grande Fire Funds

Over \$1B worth of fire and flood vulnerabilities were identified in the community and the Laboratory after the Cerro Grande Fire occurred in Los Alamos County and surrounding area in May 2000. With the help of Congress, the Cerro Grande Rehabilitation Project was developed and funded at \$342M in FY-00 and -01 to address the Laboratory's most urgent needs.

The Cerro Grande Rehabilitation efforts are being managed as a formal project, with baselines, reporting, and change control. Work scope includes: procuring Laboratory equipment that was lost during the fire; replacing Fire Department equipment and vehicles; repairing buildings; implementing erosion controls and flood controls; and addressing other vulnerabilities that resulted from the fire. The project is also executing several line item construction projects including: a new Emergency Operations Center (EOC), two small office buildings, replacement of critical portions of the Laboratory Site-Wide Fire Alarm System, installation of a Multi-

Channel Communications System, addressing damages that occurred to the DARHT project, and addressing vulnerabilities at LANL's solid and liquid waste operations facilities.

The initial Cerro Grande funding was received at LANL in August 2000. The line item construction projects, which total approximately \$100M, are being baselined. The costs and commitments as of March 31, 2001 are \$84.3M.

The Laboratory is extremely grateful for this support from the Administration and Congress.

Land Transfer

Transfer of surplus Los Alamos site DOE lands to local governments, directed by Congress in 1998, will cost approximately \$3M per year over five years for environmental and archeological work. Direct funding at that level, rather than \$1.9M as proposed in the President's Budget, will facilitate timely completion without adding to the burden carried by other programs.

OVERALL BUDGET OUTLOOK AT LOS ALAMOS FOR FY-02

One of the topics we have been asked to address for this hearing is the budget situation at our specific institution. Let me preface my comments by noting that I limited hiring at the Laboratory during FY-00 in anticipation of possible changes that might occur as the result of a transition to a new Administration. This strategic hiring program allowed us to hire essential people needed for our key mission activities but restrained hiring in other areas. This will soften any employment disruptions that could occur as a result of budget decisions made for FY-02.

I should also caveat my comments by noting that there are many steps ahead where Congress and the Administration can revise the FY-02 numbers, particularly resulting from policy reviews of the nation's defense policy and its nuclear weapons posture.

Let me now state the current budget picture as we see it for Los Alamos National Laboratory for FY-02. In the Stockpile Stewardship Program, the President's Budget should cover the inflation costs of the program at the Laboratory. Within that program, we hope to be able to avoid a reduction in force, but programmatic delays and personnel transfers among programs are likely.

In the Defense Nuclear Nonproliferation programs, the picture is more troubling. The Los Alamos share of the cuts proposed in the nonproliferation R&D and Russian programs could place the jobs of up to approximately 100 employees in jeopardy due to lack of funding. It is our hope that once the policy reviews of the new Administration are completed, both the

Administration and the Congress will agree to budget adjustments that would support this program adequately.

The reductions in the Environmental Management Program for FY-02 could lead to a reduction of approximately \$25M in the Los Alamos program. This could impact Los Alamos employment, contractor activities, and slow the pace in cleaning up old waste sites. This is of considerable concern to the Laboratory, our neighbors in Northern New Mexico and to the State of New Mexico Environment Department. We have worked with all parties to reach an agreeable cleanup schedule. That is now jeopardized by the proposed cuts.

These cuts are also likely to delay the shipments of waste from Los Alamos to the WIPP site in Carlsbad, New Mexico. Our goal was to accelerate from 6 shipments per week to 12-14, but this probably will not be possible under the proposed budget. We would much prefer to move to the accelerated schedule. The wastes are much better cared for by being thousands of feet below ground than on the surface at Los Alamos.

In the science and energy programs the size and impact of reductions to Los Alamos programs are less clear at this time and may change as the FY-02 budget evolves. The Office of Science receives essentially flat funding (with no inflation adjustment), but some programs within that office receive cuts that we hope will be reconsidered. For example, the Biological and Environmental Research (BER) programs receive a reduction of \$50M, or 10% at the same time that the National Institutes of Health receive very substantial increases. There are national security programs that rely on the capabilities of the BER program. These would be harmed if the reductions are not reversed.

NATIONAL NUCLEAR SECURITY ADMINISTRATION REORGANIZATION

The witnesses today have been asked to comment on the National Nuclear Security Administration's reorganization put forward in March. The Laboratory Directors had the opportunity to discuss organizational issues with Gen. Gordon in sessions prior to the announcement of his plan. I will provide any assistance Gen. Gordon requests as he continues to develop the organizational structure of NNSA. I am very hopeful that the changes announced in March will address some of the fundamental organizational issues of the new administration.

The NNSA leadership has established streamlining of functions as one of its goals. I am confident that the two new associate administrators—one for facilities and operations and

another for management and administration—will facilitate communication, assignments of responsibilities, and decision making.

Gen. Gordon's plan also provides additional and strengthened venues for external liaison and communication, including an external review group, weekly telephone conferences, a management council, and a revitalized Nuclear Weapons Council. The Management Council will be able to emphasize the integration and synergy that is needed throughout the NNSA. His belief that the Nuclear Weapons Council must be revitalized as a mechanism to get improved agreement between the Department of Defense and the Department of Energy has our strong support.

CONCLUDING REMARKS

In conclusion, I will repeat that the Stockpile Stewardship and Nonproliferation programs continue to work, but the loss of human resources and failure of infrastructure threaten our continued ability to perform critical tasks. With support from the Congress, the NNSA can turn this situation around:

- Gen. Gordon has developed a Future Years Defense Plan (FYDP) to bring national security requirements and resources into alignment. This requires strong congressional support.
- The plan includes re-capitalization of the infrastructure needed to execute the assigned mission. Without this, the programs cannot succeed.
- Attention must also be given to attracting and retaining outstanding people through broad engagement in the world of science and technology, as recognized in NNSA's Mission 6. This means that the laboratories must be able to participate in the science programs outside of the NNSA, particularly those sponsored by DOE's Office of Science.
- Attention should be directed to security and cyber security to ensure that the requirements are appropriate and the resources are commensurate.

Finally, I will say that, past and present difficulties notwithstanding, we are hard at work in the NNSA and are meeting our assigned tasks to the best of our abilities. I believe strongly that there is no more competent and dedicated group of people for these tasks than can be found in the NNSA laboratories and production plants.

